



Minnesota Plant Press

The Minnesota Native Plant Society Newsletter

www.mnnps.org

Volume 32 Number 1

Winter 2013

Monthly meetings

Thompson Park Center/
Dakota Lodge
Thompson County Park
1200 Stassen Lane
West St. Paul, MN 55118

Programs

The Minnesota Native Plant Society meets the first Thursday in October, November, December, February, March, April, May, and June. Check at www.mnnps.org for more program information.

6 p.m. — Social period

7 – 9 p.m. — Program, Society business.

Feb. 7: Ecophysiology of Woodland Wildflowers, by Dr. Stephen Saupe, professor, Biology Department of the College of St. Benedict and St. John's University. **Plant-of-the-Month:** White snakeroot (*Ageratina altissima*), also by Dr. Saupe.

March 7: Proposed Updates to Minnesota's List of Endangered, Threatened, and Special Concern Species: An Examination of the Administrative, Ecological and Political Processes, by Richard Baker, endangered species coordinator, Minnesota DNR, with special contributions by others. **Plant-of-the-Month:** TBD.

Symposium: Subject, date to be announced.

MNNPS questions?

Go to www.mnnps.org to see the Society blog, news about field trips, meetings, committees, and all issues of this newsletter since 1982.

Climate change and the temperate-boreal ecotone

by Lee E. Frelich, director, University of Minnesota Center for Forest Ecology. This is a summary of his presentation at the Nov. 1, 2012 Minnesota Native Plant Society meeting.

Two papers recently published by myself and colleagues (references at end of article) show that plants are buffeted from above ground by herbivores such as deer and moose, which are in turn regulated partly by wolves, and from below ground by invasive European earthworms. These trophic interactions will help determine how the temperate forest, composed of species like maple, basswood, and oak, expands into the boreal forest of spruce, fir, paper birch, and aspen.

The paper "Sapling growth responses to warmer temperatures 'cooled' by browse pressure," in the journal *Global Change Biology*, resulted from a project by recently graduated Ph.D. student Nick Fisichelli at the University of Minnesota. It shows that deer can reduce growth rates of temperate tree species as the climate warms.

The study was done in northern Minnesota — plots with high and low levels of browsing by deer were surveyed along a climate gradient from the boreal zone south to the temperate zone. This included the zone of overlap in temperate and boreal species ranges, where the two species groups grow together within one stand of trees. Hundreds of saplings were destructively sampled in the field. "Cookies" were cut from the stems throughout their height so that age, radial increment and height growth could be reconstructed for each sapling. Summer temperature and precipitation, and a measure of deer browsing pressure were estimated for each plot. The summer temperature gradient across the study region was about 4.5 degrees F.

On plots with low deer browsing pressure, boreal spruce and fir height growth was consistently less as summer temperature increased, while temperate species — sugar maple and red maple — grew more with warmer summers. Red oak did not respond to temperature. Most importantly, maple and oak growth rates were higher than boreal

Continued on page 3

In this issue

Taxonomy notes	2
New members	2
Society news	2
Symposium	2
Larch beetles vs. tamaracks	4
Mystery weed	6
President's column	7
Plant Lore: Mountain maple ..	7

Taxonomy notes

A bibliography of plant families, scientific names

Compiled by Shirley Mah Kooyman

Botany in a Day (5th edition), by Thomas J. Elpel, 2008. HOPS Press, LLC, Pony, Montana. 221 pp. A field guide to plant families of North America using the method of patterns of plant identification.

Plant Systematics - A Phylogenetic Approach (3rd edition), by Walter S. Judd, Christopher S. Campbell, Elizabeth A. Kellogg, Peter F. Stevens, and Michael J. Donoghue, 2008. Sinauer Associates, Inc., Sunderland, Massachusetts. 611 pp. This is the latest book on new thoughts of how families are related, based on current research results from molecular biology. A very thorough book used by many as a textbook for teaching.

Species Plantarum, by Carl Linnaeus, 1753. (Facsimile, reprinted 1957), two volumes, Adlard and Son. Bartholomew Press, Dorking, Great Britain. 1,200 pp. This is the bible for the beginning of the Binomial System of plant classification.

Gardener's Latin, by Bill Neal, 1992. Algonquin Books of Chapel Hill, N.C. 136 pp. A type of dictionary for pronunciation and explanation of specific epithets.

Vascular Plant Families, by James Payne Smith, Jr. 1977. Mad River Press, Inc., Eureka, California. 320 pp. Plant families described with line drawings, summary of specific identifying characteristics, and floral formulae.

Botanical Latin (4th Edition), by William T. Stern, 1992. Published in North America in 1995 by Timber Press, Inc., Portland, Oregon. 546

pp. A great book that summarizes the grammar and syntax of botanical Latin. Covers the roots and origins of Latin and latinized terms for anyone who has never taken Latin.

Guide to Flowering Plant Families, by Wendy B. Zomlefer, 1994. The University of North Carolina Press, Chapel Hill, N.C. 430 pp. Nicely illustrated compendium on plant families. This is a compilation of her Ph.D thesis.

MNNPS welcomes new members

The Society gives a warm welcome to 10 new members who joined during the fourth quarter of 2012. Listed alphabetically, they are:

Melissa Bach, Finland, Minn.; Dale Baumgartner, St. Paul; Amy Dykstra, Coon Rapids; Jeanette Holmen, Medicine Lake; Rosalind Johnson, Bloomington; Linda and Ron Kuchinka, Faribault; Scott Leddy, Winona; Fraser McKee, St. Paul; Rod Sykora, Minneapolis.

2012 financial report summarized

The Minnesota Native Plant Society closed the year 2012 with total assets of \$25,779. This included \$16,734 in the checking account, \$8,990 in CDs and \$55 cash on hand. Income during the year totaled \$14,667. Expenses totaled \$14,404. The net income gain was \$263.

Symposium is being planned

by Scott Milburn

Our annual symposium is currently in the planning phase with a theme similar to last year's symposium. That was "Perspectives in Botany." The date has yet to be decided, but it will either be in April or May. Stay tuned.....

MNNPS Board of Directors

President: Scott Milburn, board member, scott.milburn@mnnps.org

Vice President: Shirley Mah Kooyman, shirley.mah.kooyman@mnnps.org

Secretary, program coordinator: Andrés Morantes, andres.morantes@mnnps.org

Treasurers, membership data base: Ron and Cathy Huber, ron.huber@mnnps.org

Ken Arndt: board member, field trip chair, ken.arndt@mnnps.org

John Arthur: board member, john.arthur@mnnps.org

Steve Eggers: board member, steve.eggers@mnnps.org

Otto Gockman: board member, otto.gockman@mnnps.org

Daniel Jones: board member, daniel.jones@mnnps.org

Peter Jordan: board member, peter.jordan@mnnps.org

Mike Lynch: board member, mike.lynch@mnnps.org

Stephen G. Saupe: board member, stephen.saupe@mnnps.org

Memberships: memberships@mnnps.org

Field Trips: fieldtrips@mnnps.org

Historian-Archives: Roy Robison, historian-archives@mnnps.org

Technical or membership inquiries: contact@mnnps.org

Webmaster: Elizabeth Heck, elizabeth.heck@mnnps.org

Minnesota Plant Press editor: Gerry Drewry, 651-463-8006; plantpress@mnnps.org

Climate changes

Continued from page 1

sapling growth rates at warm temperatures. On plots with high browsing pressure, however, spruce and fir growth rates were about the same as low deer plots (reflecting the unpalatable nature of those species), while growth rates of the three temperate species were lowered compared to low deer plots, so that they all grew less than boreal species. Moreover, the positive temperature response of the maples was flattened by the deer: in warmer areas deer simply ate more. Results for radial growth were very similar.

We think this deer herbivory phenomenon will prevent temperate tree species from increasing their growth rates as the climate warms at the northern edge of their range in areas with high deer populations. This could prevent them from responding to climate change by invading the boreal forest, since boreal saplings will likely continue to grow more than temperate saplings, even when the temperature becomes less than optimal for boreal tree growth. One possible implication would be that boreal species will persist until a

threshold temperature is reached, and die suddenly, rather than being gradually replaced by temperate species.

The second paper in the *Philosophical Transactions of the Royal Society-B*, done with the help of a distinguished array of coauthors, explains why moose will be replaced by deer, and earthworm invasion will become more prominent in the temperate-boreal ecotone as the climate warms. The study examines trophic interactions among plants, herbivores like deer that eat plants, predators like wolves that eat deer, and earthworms that recycle nutrients from dead organic matter.

The variable impacts of wolves and landscape configuration on deer populations and stage of earthworm invasion across the ecotone will create a mosaic of impacts draped over the landscape as the temperate forest invades the area now occupied by the southern portion of the boreal forest.

This will lead to various impacts on the future temperate forest. In areas with low deer and earthworm impacts, the historic sugar maple-dominated forest will expand into

the boreal forest, along with its iconic plants such as large-flowered trillium. But in areas with high earthworm and deer impacts, the future temperate mesic forest is likely to be dominated by red maple (probably with ironwood, basswood and some oak), and an herb layer dominated by Pennsylvania sedge and related sedge species. Thus, the filters determining which plant species are successful will lead to a regional-scale mosaic of plant communities with varying degrees of novelty.

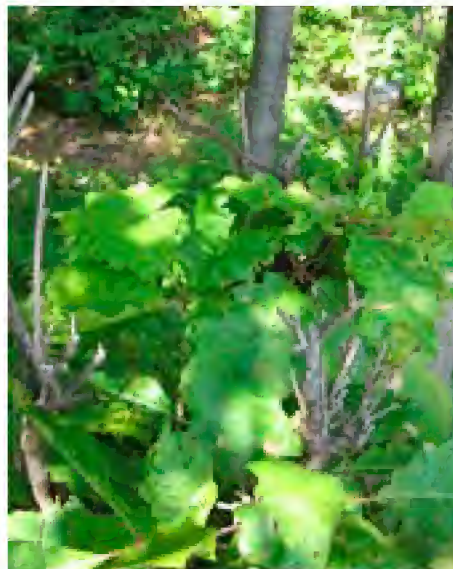
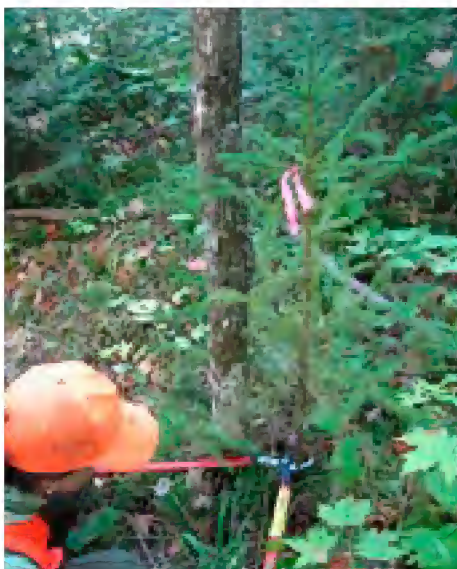
References

Fisichelli, N., L.E. Frelich, and P.B. Reich, 2012. Sapling growth responses to warmer temperatures “cooled” by browse pressure, *Global Change Biology* 18: 3455-3463.

Frelich, L.E., R.O. Peterson, M. Dovciak, P.B. Reich, J.A. Vucetich, and N. Eisenhauer, 2012. Trophic cascades, invasive species, and body-size hierarchies interactively modulate climate change responses of ecotonal temperate-boreal forest, *Philosophical Transactions of the Royal Society-B* 367: 2955-2961.

Mille Lacs Moraine SNA is designated

The Minnesota DNR, with help from The Nature Conservancy, recently acquired and designated 318 acres in Crow Wing County as the new Mille Lacs Moraine Scientific and Natural Area. Located near Garrison and Lake Mille Lacs, the SNA consists of steep hills dotted with small lakes and wetlands. It supports a variety of native plant communities from red oak-basswood forest to northern poor fen wetland. Red-shouldered hawks and cerulean warblers, two species of special concern in Minnesota, nest in the vicinity. The Nature Conservancy worked with the land’s owners, the Hormel family, to ensure the land would be protected.



This white spruce (*Picea glauca*) at the left, a species unpalatable to deer, shows no evidence of browsing. The red oak (*Quercus rubra*) has no height growth and is clearly a favorite of deer. Photos by Nick Fisichelli.

Eastern larch beetles are threat to tamarack forests

by Fraser R. McKee, Ph.D. candidate, Department of Entomology, University of Minnesota. This summarizes his MNNPS talk Dec. 6, 2012.

Bark beetles (*Coleoptera: Curculionidae*) are one of the most important insect herbivores of conifer ecosystems. Bark beetles colonize the phloem layer of trees, disrupting the movement of water and nutrients between the roots and the tree crown, often resulting in tree death. Thus, bark beetles are important agents of forest mortality and can influence tree age, size, and genetic structure; floral and faunal diversity; hydrology and water quality, as well as fire patterns within forest stands.

Bark beetles are considered as either “aggressive” or “non-aggressive.” Aggressive species exist for long periods of time as small, endemic populations, attacking weak or unhealthy trees. However, when environmental conditions are favorable, aggressive bark beetles can undergo population outbreaks.

During outbreaks, aggressive bark beetles attack healthy trees, resulting in severe, widespread forest mortality. In contrast, non-aggressive bark beetles exist through time as small, chronic populations and do not undergo population outbreaks. Non-aggressive bark beetles only colonize weakened or recently dead trees and do not cause large-scale forest mortality.

The eastern larch beetle is small, approximately 4 mm long, with a black body and iridescent, maroon wing covers. The beetle is native to North America and has a large distribution that closely matches that of its principal host tree, the eastern larch, or tamarack (*Larix laricina*). Within its range, the beetle will also attack non-native species of larch planted as ornamental trees. The main stem, large branches, and

exposed roots are colonized on trees attacked by the eastern larch beetle.

The eastern larch beetle (*Dendroctonus simplex*) is related to some of the most economically important bark beetle species, such as the mountain pine beetle (*D. ponderosae*) and southern pine beetle (*D. frontalis*). Historically, the eastern larch beetle has not been considered a species of economic importance. As a non-aggressive bark beetle, eastern larch beetles typically attack trees that have recently died, are moribund, or suffer from some form of stress (e.g., drought, mechanical injury).

The lifecycle of the eastern larch beetle consists of an egg stage, four larval growth stages (instars), a pupal stage, reproductively immature teneral adults, and reproductively mature adults. Up to three larval broods may be established per year, although only a single reproductive generation is produced.

The lifecycle begins in late April or early May, when reproductively mature beetles emerge from their natal host trees, disperse, and locate non-attacked tamaracks in which to reproduce. Female beetles emerge slightly before the males and are the host-selecting sex. As the female beetles fly through the forest, they use air-borne chemical signals emanating from host trees, as well as visual cues of tree size and shape, to orient towards trees that may be suitable hosts for beetle reproduction.

After alighting onto the bark of a potential host, the beetles chew through the outer bark and into the phloem layer. While tunneling into the tree, the beetles encounter resin pockets used by the

tree to defend against insect and pathogen invasion. The chemical composition and toxicity of the resin is evaluated by the invading beetles. If the beetles find the resin noxious, they will abandon the attack and disperse to a more suitable host. If the beetles are not deterred and the host is suitable, they will release aggregation pheromones to attract conspecific female and male beetles to the focal tree undergoing attack.

Beetles arriving at the focal tree also release aggregation pheromones, resulting in a rapid increase in the number of attacking beetles on a focal tree. As the density of attacking beetles increases, anti-aggregation pheromones are released to repel and re-direct arriving beetles into nearby trees. The use of anti-aggregation pheromones prevents over-crowding within a single tree and avoids intraspecific resource competition among the beetles.

Once attacked, tamaracks undergo an induced resin response that increases the production of resin throughout the tree tissues. Increased resin production creates an effective physical barrier to beetle entry. Also, the toxicity of the resin is increased to maximize mortality levels among the attacking beetles. Tamaracks that rapidly up-regulate the resin defense response during the initial phases of beetle attack may kill the beetles before they release aggregation pheromones and avoid further attack.

There is an energy cost associated with increased resin production within a tree. Healthy trees with large energy reserves are better able to increase resin production to defend against beetle attack relative to weakened or stressed trees that have small energy reserves. Because defending against each beetle attack requires an expenditure of energy by the tree, each new beetle attack reduces the tree's ability to defend against subsequent attacks. The use of aggregation pheromones by the

beetles often results in the attraction of more attacking beetles than a tree can successfully defend against. This use of aggregation pheromones to initiate a mass-attack is an evolutionary strategy used by the beetles to overwhelm the defensive ability of the host tree. Eastern larch beetles also vector symbiotic fungi that rapidly invade the phloem and sapwood of the host and reduce the tree's ability to increase resin production in response to beetle attack.

Once a host tree is successfully killed, the beetles begin to construct egg galleries. Initially, egg galleries are excavated vertically up the trunk of the tree and have a slightly winding "S" shape. As more egg galleries are excavated; the galleries begin to intersect one another to form a network. Eggs are laid in small niches cut into the sides of the egg gallery. Each niche contains from zero to four eggs for an average of 1.2 eggs / cm of egg gallery. Eggs can be found in the galleries from mid-May to late June.

Upon hatching, larvae feed in individual larval galleries that are oriented away from the egg gallery. Larvae feed through four growth stages (instars) and are present in the host tree from late June to early August. Fourth instar larvae create a chamber at the end of the gallery in which to pupate. Pupae can be found from mid-July to mid-August.

Teneral adults are found from late August to the following May and are the predominant over-wintering life stage. Some teneral adults remain in the pupal chamber over the winter, while others emerge, drop to the base of the tree, and over-winter in a small, newly constructed gallery. The following spring, the teneral adults engage in a period of maturation feeding under the bark and then emerge as reproductively mature beetles, completing the lifecycle.

Reports of eastern larch beetle



Fully mature eastern larch beetle adult. Photo by Fraser R. McKee.

activity have been recorded in North America for over 100 years. Historically, instances of beetle outbreaks were confined to small, localized areas that were predisposed to beetle attack due to some form of stress (e.g., insect defoliation, flooding, and drought), although beetles were reported to attack healthy trees after the supply of stressed material had been exhausted. This low-level tamarack mortality indicated that eastern larch beetles should be considered as non-aggressive bark beetles.

However, in 1973, an outbreak of eastern larch beetles began in Alaska. The initial cause of the outbreak was uncertain, but repeated defoliation of tamarack by a species of larch budmoth (*Zeiraphera* spp.) in 1975 and 1976 caused the outbreak to rapidly increase in size to 215,000 hectares by 1977. Over 3.3 million hectares of tamarack were affected by 1980, when the outbreak ended.

Similarly, from 1973 until 1986, outbreaks of eastern larch beetles occurred on the east coast of North America from Newfoundland, Canada south through the Maritime Provinces of Nova Scotia, New Brunswick, and Prince Edward Island, and westward into Quebec.

In the United States, the outbreak affected large areas of Maine, New Hampshire, Vermont, and New York. Causes of the outbreak varied by region. Predisposing factors linked to the beetle outbreaks

were defoliation by western spruce budworm (*Choristoneura occidentalis*), larch sawfly (*Pristiphora erichsonii*), and larch casebearer (*Coleophora laricella*). A general decline in tamarack health was also credited as a predisposing factor to beetle attack in some areas. In other areas, the cause was unknown. Tamarack mortality within affected stands throughout the east coast outbreak exceeded 75 percent in some areas. Estimates of timber volume loss were not made for all areas of the outbreak; however, more than 1.4 million cubic meters of tamarack were killed in the Maritime Provinces.

The eastern larch beetle outbreaks in Alaska and the east coast of North America were the first records of large-scale outbreaks by this insect. An outbreak of eastern larch beetles in Minnesota has been occurring since 2000. To date, more than 160,000 hectares of tamarack forest have been affected, causing severe tamarack mortality. In many areas, more than 90 percent of the available tamarack has been killed. The cause of the present outbreak is not clear. Tamarack defoliation by a concurrent outbreak of larch casebearer does not appear to be associated with beetle activity.

Research by the Minnesota DNR has determined that only 5 percent of tamaracks killed by eastern larch beetles have been previously defoliated by the larch casebearer. The DNR data suggest that above-average annual temperatures, particularly during the past decade, may be a factor in the outbreak. Warmer temperatures during the spring and summer would allow beetle larvae to develop more rapidly and be fully mature before the onset of cool weather in the fall. Also, warmer fall and winter temperatures may reduce the level of over-wintering beetle mortality. This could result in larger populations of

Continued on page 7

Can you identify this weed?

by Gerry Drewry

The weed in the photos at the right is a mystery to the farmer who found it, to the local elevator, and to Syngenta Seed employees at Stanton, near Northfield, Minn. Now our Society has been asked to identify it.

Do you know what it is? We do not think this plant is normally found in Minnesota. So we are turning to our readers. This is the information we have:

- The weed grows in a field near Northfield, in Rice County.

- It was first noticed about three years ago after hog manure had been spread on the farm.

- The field has been in continuous corn for the last three years.

- This weed shows up in August, after the corn has tasseled and is setting ears.

- It is three to four feet high by harvest time. However, some plants growing along the fence line are six to seven feet tall.

- The main stem is approximately $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter and remains sturdy after the plant dies.

- There are approximately 12 sets of opposite branches on the main stem.

- The serrated leaves are long and pointed.

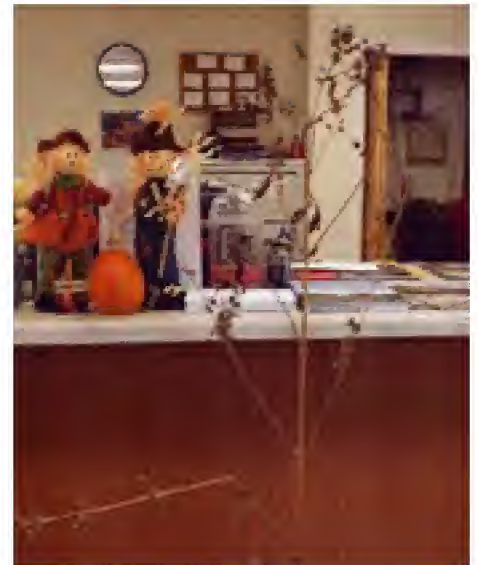
- Seeds are in pods under the leaves.

We have received several possible identifications but have no definite answer. One guess is *Acalypha rhomboidea*, "though none of the *Acalypha* sp. get much over two feet tall." The dried plant looks like *Ambrosia trifida*.

If you know what plant this is, send an e-mail with your answer to plantpress.mnnps@mnnps.org We will print the ID in our next newsletter.



Two photos of mystery weed.



Weed placed in elevator office.



President's column

by Scott Milburn

If you have not heard yet, the Minnesota DNR has proposed updates to the *Minnesota List of Endangered, Threatened and Special Concern Species*. This list is supposed to be updated every three years, but was last revised in 1996. The proposed revisions are posted online at <http://www.dnr.state.mn.us/ets/rulesrevision.html>. This site also lists the associated hearing dates and locations.

The only metro hearing will take place the evening of Feb. 7, which conflicts with our monthly meeting. The conflict in dates is unfortunate and disappointing. What I encourage our members to do is to be active and to provide written comments if you see a problem with a proposed status change.

I would also like to bring up my personal opinion regarding the lengthy time span between revisions. This sets a poor precedent, as, with climate change, we may encounter future situations that could result in population crashes of certain species. The moose serves as a prime example of what I am worried about. This species is being proposed for the status of Special Concern. Consider a situation of a severe population crash in the next few years. There is no legislation that allows for an immediate change in status if warranted, and 17 years plus between revisions is not what we need. This should be addressed in these hearings.

Additionally, please question whether some of these status changes or the lack of a status change are the result of science, or of politics and pressure from special interests groups. It is obvious that our Society is often overlooked, but now is a critical time to provide input and to speak up.



Blooming mountain maple shrub (Acer spicatum). Photo by Peter Dziuk.

Larch beetle

Continued from page 5

reproductively mature adult beetles the following spring, increased beetle attack on tamaracks, and larger beetle populations. Finally, Minnesota has been experiencing drought conditions throughout much of the state over the last decade. Prolonged drought stress lowers tree health and vigor, reduces the defensive ability of the trees, and makes the trees more susceptible to beetle attack.

The outbreaks of eastern larch beetles in Alaska and eastern North America have prompted some forest entomologists to suggest that the eastern larch beetle should be considered as an aggressive bark beetle species. Certainly, the size, severity, and longevity of the current beetle outbreak in Minnesota reinforce such sentiment. While outbreaks of eastern larch beetles have previously been a rare event, the outbreak in Minnesota provides excellent opportunities for research.

Current research by the forest entomology laboratory of Professor

Plant Lore

by Thor Kommedahl

What is mountain maple?

Mountain maple is *Acer spicatum*, in the maple family — the only maple shrub.

What do its names mean?

Maple is an Old English word used in the 14th century. *Acer* is a Latin word for maple, and *spicatum* means spiked, referring to its inflorescence.

Where does the plant grow?

It is native to the wooded areas in northeast Minnesota and in border counties of southeast Minnesota. It is often an understory shrub or small tree in both coniferous and deciduous forests.

What does the plant look like?

It is a shrub or small tree with dark or somewhat greenish bark, velvety-hairy twigs, and three- to five-lobed leaves. The many yellowish-green flowers are borne in an erect panicle — a “spiked” inflorescence. The winged fruit is a schizocarp of two mericarps (or a double samara). It forms colonies by sprouting from underground stems and by layering.

Does it have any medicinal value?

The Potawatomi Indians used the inner bark materials for making a cough syrup, and the Micmacs made an infusion from the outer bark to treat sore eyes. This species was listed in the *U.S. Pharmacopeia*. The pollen is a moderate allergen.

Has it any other values?

It is browsed by deer, moose, and cottontails, and the buds are eaten by ruffed grouse. It is sometimes planted as an ornamental.

Brian Aukema at the University of Minnesota and the DNR is directed at studying the biology of the eastern larch beetle in Minnesota, determining the cause of the beetle outbreak, and examining the interactions between the beetle and its host tree that affect the reproductive success of the beetle.

Minnesota Native Plant Society
P.O. Box 20401
Bloomington, MN 55420

Winter 2013

Thompson County Park:
360 Butler Ave East, West St. Paul, MN 55118



Directions:

Take Highway 52 to the Butler Ave. E. exit in West St. Paul.
Go west on Butler 0.2 mile to Stassen Lane.
Go south on Stassen Lane to Thompson County Park.



Minnesota Plant Press

The Minnesota Native Plant Society Newsletter

www.mnnps.org

Volume 32 Number 2

Spring/Summer 2013

Where has the Plant Press Been?

Earlier this year, Gerry Drewry, after years of exemplary work editing the *Minnesota Plant Press*, decided to step down and hand the responsibility of editing the Plant Press to a new editor. The MNNPS Board accepted my offer to take over editing the *Plant Press*. While I had hoped for a seamless transition from Gerry's work, I instead stumbled badly in taking over this important responsibility, with the result that the *Plant Press* is several months late in getting to you. You have my promise that I will correct this, and that you will still receive four issues of the *Plant Press* this year. Please accept my sincere apology for the delay in getting the *Plant Press* to you.

-Daniel W. Jones, *Minnesota Plant Press* editor

Monthly meetings

Thompson Park Center/
Dakota Lodge
Thompson County Park
1200 Stassen Lane
West St. Paul, MN 55118

Programs

The Minnesota Native Plant Society meets the first Thursday in October, November, December, February, March, April, May, and June. Check at www.mnnps.org for more program information.

Ecophysiology of Forest Wildflowers

by Stephen G. Saupe, Biology Department, College of St. Benedict/St. John's University This is a summary of his presentation at the February 7, 2012 Minnesota Native Plant Society meeting.

Consider round-lobed hepatica (*Anemone americana*) and zig-zag goldenrod (*Solidago flexicaulis*). In central Minnesota the peak bloom period for round-lobed hepatica is the first week of May, while for zig-zag goldenrod it is the first week of September. As a consequence, even though these forbs grow in the same forest they must contend with radically-different conditions.

Spring-flowering forbs, like round-lobed hepatica, that bloom before canopy closure have at least 20 times more light available for photosynthesis than the summer-flowering forbs like zig-zag goldenrod. Similarly, spring-forbs also have a greater and more predictable water supply and they must deal with cooler temperatures and more wind than summer-forbs. In response, the spring- and summer-forbs employ different ecophysiological survival strategies.

The availability of light is arguably the most important factor. The shady and drier conditions on the forest floor in the summer make it an especially challenging place to make a living. This explains, in part, why the frequency of angiosperms that bloom in a Minnesota forest is greatest in May and then steadily declines throughout the growing season.

Considering the limited availability of light, it's not too surprising that summer-forbs typically photosynthesize at about half the rate of spring-forbs. However, they are much more efficient at using the light they do get. For example, summer-forbs have a lower light saturation point, which refers to the amount of light at which a plant reaches its maximum photosynthetic rate. This means that a summer-forb needs less considerably light than a spring-forb to accomplish the same amount of photosynthesis.

Acting like a large television antenna to help harvest the limited light in shady woodlands, leaves of summer-forbs typically have a larger surface area and are packed with

Continued on page 3

In this issue

Taxonomy notes	2
Treasurer's report	2
New MNNPS members.....	3
Plant Species Profiles.....	4
John Torrey Biography.....	6
President's column	7
Plant Lore: A forget-me-not	7

Taxonomy notes

Gender and Words, with a Humorous Example

By Shirley Mah Kooyman

In a past issue of the *Plant Press*, I wrote about gender and plant names particularly as related to trees. Here is a quick refresher on botanical Latin. The genus is a noun and the specific epithet is an adjective. Except for some exceptions the genus and specific epithet match in gender. As in Latin, the general rule is: male = "us", neuter = "um", female = "a" (Examples: *Helianthus tuberosus*, *Chenopodium album*, *Dicentra cucullaria*). Many foreign languages have the relationship of gender and words. In the English language such a relationship doesn't exist so it's difficult for English speakers to understand that. A number of years ago I received an e-mail with a funny example of a word in Spanish and the question of whether it should be masculine or feminine. I have since lost the name of the author so I can't give that person credit for the following humorous example. I hope when you read this you don't take offense and think that I'm being a sexist.

Here is the story as I had received it. A Spanish teacher was explaining to her class that in Spanish, unlike English, nouns are designated as either masculine or feminine. "House" for instance, is feminine: "la casa". "Pencil", however, is masculine: "el lapis".

A student asked, "What gender is 'computer'?" Instead of giving the answer, the teacher split the class into two groups, male and female, and asked them to decide for themselves whether "computer" should be a masculine or a feminine noun. Each group was asked to give four reasons for its recommendation.

The men's group decided that "computer" should definitely be of the feminine gender "la

computadora", because:

1. No one but their creator understands their internal logic.
2. The native language they use to communicate with other computers is incomprehensible to everyone else.
3. Even the smallest mistakes are stored in long term memory for possible later retrieval.
4. And as soon as you make a commitment to one, you find yourself spending half your paycheck on accessories for it.

The women's group, however, concluded that computers should be masculine "el computador", because:

1. In order to do anything with them, you have to turn them on.
2. They have a lot of data but still can't think for themselves.
3. They are supposed to help you solve problems, but half the time they are the problem.
4. And as soon as you commit to one, you realize that if you had waited a little longer, you could have gotten a better model.

So it seems the women have won in this case since in Spanish it is "el computador".

Treasurers' report

On June 30, 2013, the Society had \$27,997.47 in assets. This included \$18,929.74 in the checking account, \$9,012.73 in CDs, and \$55 cash. From Jan. 1 through June 30, income totaled \$8,008.20; expenses were \$5,814.14, for a net gain of \$2,194.06. Dues totaled \$2,887.00. Symposium income was \$4,055.00; its expenses were \$4,613.82.

A more comprehensive Treasurer's report will be provided in the next issue of the *Plant Press*.

MNNPS Board of Directors

President: Scott Milburn, board member, scott.milburn@mnnps.org

Vice President: Shirley Mah Kooyman, shirley.mah.kooyman@mnnps.org

Secretary, program coordinator: Mike Lynch, mike.lynch@mnnps.org

Treasurers, membership data base: Ron and Cathy Huber, ron.huber@mnnps.org

Ken Arndt: board member, field trip chair, ken.arndt@mnnps.org

John Arthur: board member, john.arthur@mnnps.org

Steve Eggers: board member, steve.eggers@mnnps.org

Otto Gockman: board member, otto.gockman@mnnps.org

Peter Jordan: board member, peter.jordan@mnnps.org

Angela Anderson: board member, angela.anderson@mnnps.org

Jyneen Thatcher: board member, joyneen.thatcher@mnnps.org

Memberships: memberships, mnnps@mnnps.org

Field Trips: fieldtrips.mnnps@mnnps.org

Historian-Archives: Roy Robison, historian-archives.mnnps@mnnps.org

Webmaster: Elizabeth Heck, eheck@landmarkgroups.com

Minnesota Plant Press editor: Daniel W. Jones, 507-581-2517; plantpress.mnnps@mnnps.org

Post Office Box:
Minnesota Native Plant Society
P.O. Box 20401
Bloomington, MN 55420

Ecophysiology of Wildflowers

Continued from page 1

more chlorophyll than the leaves of spring-forbs. In an attempt to outcompete their neighbors for the limited light, the summer-forbs are normally taller and less branched than the spring-forbs. Being short has an added advantage for the spring-forbs; it is warmer next to the soil surface which is a bonus in the springtime.

In forests with relatively uniform conditions throughout the growing season such as a rain forest, the leaves of forbs and trees are similar. However, in our forests the leaves of the forbs are more commonly dissected and compound while those of trees are simple. The advantage of dividing leaves into sections is that it breaks up the leaf boundary layer which increases carbon dioxide uptake for photosynthesis. The drawback is that it results in higher rates of water loss. Presumably for the trees, the advantage of increased photosynthesis with compound leaves is trumped by the loss of water. Since water is generally more abundant during the spring, we hypothesized that spring-forbs would have a greater frequency of compound and dissected leaves than the summer-forbs. Though this trend exists in central Minnesota forests, it is not statistically significant.

Spring-forbs live their life in a hurry. Or, as the old expression goes, they need to “make hay while the sun shines.” Spring-forbs must complete their life cycles before the canopy closes and they go on a light “diet.” Thus, these plants have a shorter bloom time than summer-forbs. And since the spring-forbs have more light available and ultimately more resources to invest in growth, spring-forbs grow more rapidly and develop more synchronously than summer-forbs.



Round-leaved hepatica (*Anemone americana*).

Photo by Christopher Noll, courtesy University of Wisconsin-Stevens Point

Spring-forbs are typically perennials that arise from a bulb, corm or tuber. There simply isn't enough time for most annuals to complete their life cycle between when the soil is warm enough for seed germination and canopy closure. Cold is an important signal to help ‘tell’ the perennial spring-forbs when to break dormancy and begin growing. In fact, the more cold they get, the quicker spring-forbs emerge and the larger many will grow. Similarly, a cold treatment of the plant is usually necessary to trigger flowering. Called vernalization, it insures that the plants bloom soon after emerging. Some plants, such as *Hydrophyllum virginianum*, even respond to the amount of cold they receive; the more cold it gets the shorter the time to flowering. A long cold-treatment suggests to the plant that there was a long winter and that there will be a short growing season before canopy closure. They don't have much time to ‘git er done.’

The cooler, unpredictable weather in the springtime means that pollinators, and the days on which a pollinator can fly, are more limited

Continued on Page 4

MNNPS welcomes new members

The Society gives a warm welcome to 35 new members who joined during the first and second quarters of 2013.

Listed alphabetically, they are:

First Quarter 2013:

Rich Baker, Golden Valley, MN
Marta Behling-Roser, Minneapolis
Sarah Braman, St. Paul
Christy Caine, Hackensack, MN
Timothy Craig, Duluth, MN
Kathryn Erion, Shakopee, MN
Edward Heinen, Burnsville, MN
Gary Johnson, Oswego, IL
Larry Kennebeck, Golden Valley, MN
Laurie Marinucci, Minneapolis
Chad Miller, Anoka, MN
Jim Platt, Apple Valley, MN
David Senn, Minneapolis
Sharon Toscano, St. Paul
Annalisa Weiler,
Liz Zinsli, Minneapolis

Second Quarter 2013:

Mike Anderson, Inver Grove Hts, MN
Melissa Bokman, Faribault, MN
Joan Brandwein,
Mark Davis, St. Paul, MN
Lindsey Hoffman, St. Paul, MN
Nathan Hvidsten, St. Paul, MN
Zachary Johnson, Minneapolis, MN
Jennifer Larson, St. Paul, MN
Joseph Lutz, Minnetonka, MN
Erik & Larissa Mottl, Forest Lake, MN
Dick Oehlenschlaeger, Mounds View, MN
Eric Ogdahl, Mounds View, MN
Rob Ophoven, Breezy Point, MN
Mitchal Peterson, St. Paul, MN
Erik Runquist, Apple Valley, MN
Amber & Kyle Steele, Albert Lea, MN
Daniel Wovcha, Minneapolis, MN

Welcome, New Members!

Ecophysiology of Wildflowers

Continued from page 3

than in the summer months. One consequence is that a large percentage of spring-forbs, like other plants that grow in adverse conditions (i.e., alpine species), are self-compatible. This insures a seed crop even without pollinators. In addition, spring-forbs aren't especially picky about their pollinators – most can be pollinated by more than one pollinator. Their flowers are usually bowl-shaped to allow access by a diversity of pollinators and they are commonly white, somewhat analogous to a lighted billboard. There are a few spring-forbs, like Dutchman's breeches, that are specialist species. They rely on queen bumblebees for pollination. Interestingly, the specialist species often grow in large colonies to encourage their pollinators to hang around.

Just like a grocery store distributing free samples to entice customers, some spring-forbs such as toothwort and spring beauty produce nectar to help attract pollinators. Others, such as bloodroot and hepatica, don't produce nectar but rely solely on their good-looks. These non-nectar producers usually flower early when the physiological cost of nectar production isn't justified by the lower frequency of pollinators. In a very clever strategy that may be a kind of mimicry, when non-nectar producers grow in clumps with nectar-producing species, pollinators visit them more often. Mom was right – it pays to pick your friends wisely.

In conclusion, round-lobed hepatica, zig-zag goldenrod, and other woodland forbs have evolved an amazing suite of physiological adaptations to grow in our woodlands at different seasons. Plants are truly smarter than we think!



Zig-zag goldenrod (*Solidago flexicaulis*).

Photo by Merel Black courtesy University of Wisconsin-Stevens Point

Two Proposed Threatened Plant Species

by Scott Milburn

[Editors note: The Minnesota DNR has finalized proposed changes to the State's endangered, threatened and special concern (ETSC) species list. Two species with a change in ETSC status are profiled here.]

***Utricularia geminiscapa* Benj.**

U. geminiscapa is generally distributed in the northeast portion of North America and successfully avoided detection in Minnesota until 2004. The discovery was made by Perry Scott who happens to be a longtime cellist with the Indianapolis Symphony Orchestra. To date, there have only been eight total collections in the state. It's a species of bog pools and softwater lakes, which can make collecting a difficult task.

U. geminiscapa is a member of the bladderwort family and one of eight

members in the genus *Utricularia* to inhabit Minnesota. Two of the other *Utricularia* species, *U. purpurea* (E) and *U. resupinata* (T) are currently state-listed. *U. geminiscapa* is now listed as Threatened. The specific epithet is based on the morphology of this bladderwort, with gemellus referring to being twin-born or paired, and scap referring to the scape itself. Depending on preference of common name, one can refer to this species as the twin-stemmed bladderwort or hidden-fruited bladderwort.

It is easy to understand why so few records have been documented due to the diminutive size. The leaves are reduced and are alternating. Small bladders are present as is typical with other members of the genus. The bladders, which are actually modified leaves, serve to provide a source of nutrients for the plant by allowing for the trapping of small insects and larvae. Once captured, these organism are digested and provide nutrients to the plants. This species, unlike any other members of the genus in Minnesota, has both chasmogamous and cleistogamous flowers. The chasmogamous flowers resemble those of *U. vulgaris*, but at a reduced size. The species will generally flower in August through September, making it easier to detect. Yet, the easiest way to identify this species is the presence of the cleistogamous flower. These flowers lack the typical petal and sepal structure and are likely submerged.

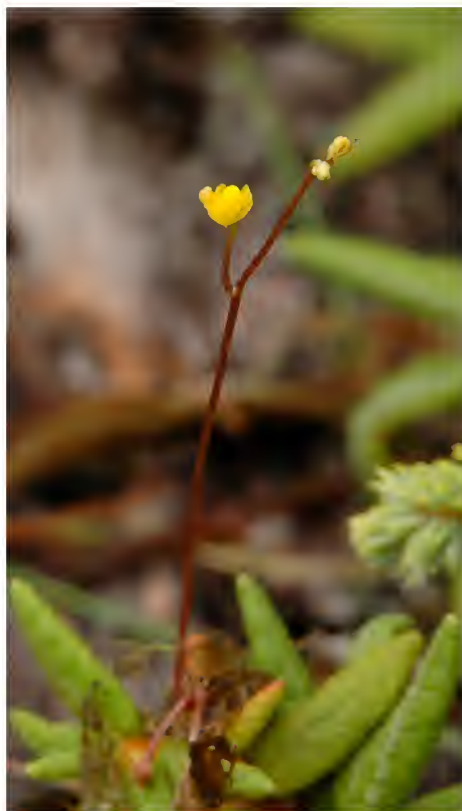
Continued on Page 5

MNNPS questions?

Go to www.mnnps.org to see the Society blog, news about field trips, meetings, committees, and all issues of this newsletter since 1982, except the current year.

Two Proposed Threatened Plant Species

Continued from Page 4



Utricularia geminiscarpa
(Hidden-fruited bladderwort)

Photo by Scott Milburn

Carex novae-angliae Schwein.

New England sedge is a member of the Cyperaceae and one of 150 plus species of *Carex* in Minnesota. Generally all but two species in this genus are native to Minnesota, the exceptions being *C. bushii* and *C. shortiana*. What separates *Carex* from the remainder of the genera in the family is that the ovary is enclosed in a sac-like structure technically referred to as a perigynium.

The distribution of this species is as far east as Newfoundland, down south to West Virginia, and as far west as Minnesota. New England sedge remained undetected in Minnesota until 2001, when Michael Lee of the Minnesota Biological Survey detected the species in Lake County. Since then, it has been well

documented within a linear area that now extends into Cook County. Despite the increase in the number of detections in the past decade, this species is being proposed under the status of Threatened. That is a very agreeable decision based on the limited distribution range in Minnesota.

C. novae-angliae inhabits moist upland forests and transitions between upland forests and forested wetlands. This species has filiform leaves and is loosely cespitose. It resembles *C. radiata* and *C. rosea* in appearance, but the combination of white perigynia and black achenes allow for an easy pair of diagnostic features to hone in on when targeting this species. However the perigynia may be lacking, thus making an accurate identification very difficult.

[Editor's note: the Minnesota DNR revised list of ETSC species became effective on August 19, 2013. The Plant Press will discuss the new ETSC list in the next issue.]

DNR News Release: Spruce needle rust appearing in northern Minnesota

Homeowners in northern Minnesota are noticing their spruce trees turning tan, yellow, orange or sometimes, pink. Most likely these trees are infected with the spruce needle rust fungus, which presents an aesthetic problem but seldom a tree health problem, according to the Minnesota Department of Natural Resources (DNR).

Spruce needle rust infects current-year needles of blue spruce but can also be found on white and black spruce. Infected needles will turn yellow and then shed in the fall. However, healthy buds on the ends of the branches will produce new needles the following year.

“Seeing favorite ornamental trees turn a rusty color and appear to be dying can cause concern, but

Continued on Page 6



Carex novae-angliae Schwein - New England sedge *Photo by Scott Milburn*

Botanists in History: John Torrey

John Torrey (1796-1873) was an American botanist from New York who played a major role in describing and classifying the wealth of previously-unknown plants pouring in from the great exploration of the American West in the early to mid-1800s. Torrey was originally a chemist and a physician, and his earliest hope was to be a machinist. However, his interest in botany was piqued at an early age, when his father took a position at a New York State Prison, and the young Torrey met Amos Eaton, who was at the prison under different circumstances. Eaton was a scientist who later co-founded the Rensselaer School (now Rensselaer Polytechnic Institute) – but who, at the time he met young John Torrey, was serving a five-year sentence for forgery. Eaton tutored Torrey in botany, and it became a lifelong passion for Torrey.

By 1819, Torrey had written his *Catalogue of Plants Within Thirty Miles of the City of New York*, followed in 1824 by the *Flora of the Northern and Middle States*. As a plant taxonomist, Torrey was influential in his adoption of the “natural system” of classification, based on the structure and function of plants, as opposed

to the Linnean system, which was based on the arrangement of male and female structures of the flower. Torrey felt that the Linnean system would “go down and I should not like to be the one to prop it up.”

Torrey's reknown as a plant taxonomist was well-known as botanical and other biological explorers began to study the vast new territories of the United States. Many expeditions sent samples from their collections to Torrey, including the explorations of Wilkes, Fremont, the Joseph Ives Colorado River expedition, the Mexican Boundary expedition and the Pacific railroad survey. Torrey himself did not travel west, admitting that “I have not herberized outside of a circle of 400 miles radius” of New York City.

Torrey later became the New York state botanist. In the mid-1830s, Asa Gray came to New York to study with Torrey. The two became lifelong colleagues, and together co-wrote the early portions of the *Flora of North America*.

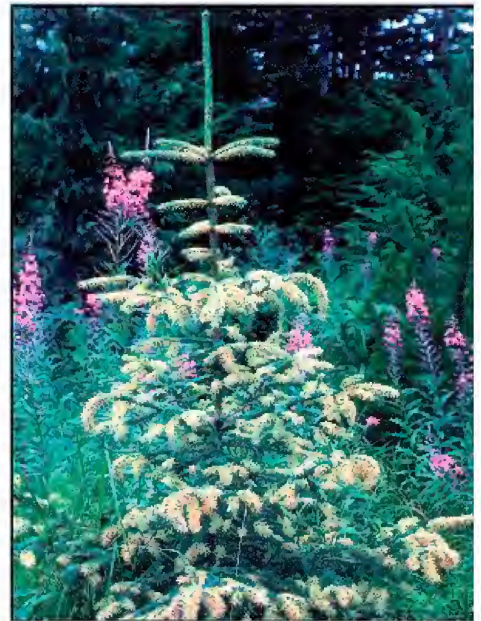
Fourteen endangered, threatened or special concern plant species currently protected in Minnesota were described by Torrey, including seven in the Cyperaceae. The Latin name of pale false manna grass, *Torreyochloa pallida*, means “Torrey's pale grass”. [Note: *Torreyochloa pallida* was formerly a special concern species, but was removed from the state's ETSC list, effective August 19, 2013.]

John Torrey's name is most famously attached to the Torrey pine (*Pinus torreyana*), a beautiful, rare pine found near San Diego. The botanical explorer Charles Parry found the tree, and asked Torrey's permission to name it after Torrey.

Continued from Page 5

homeowners shouldn't rush to cut them down,” said Mike Albers, DNR forest health specialist. “The fungus only infects the current year's needles, and does not spread from tree to tree.” In some years, like this one, spruce needle rust is very common; but in most years it is difficult to find because it requires other plants and specific growing conditions to complete its life cycle.

In early summer, the rust fungus produces spores on the leaves of



Spruce needle rust.

Photo courtesy USDA Forest Service Leaflet R10-TP-99, August 2001

Labrador tea or leather leaf, which grow in peatlands and swamps.

Winds can blow these spores onto current-year spruce needles. Rust fungus produced by the infected tree can reinfect and overwinter on alternate host plants, but this is generally interrupted by changing weather conditions.

Chemical control with a fungicide is usually not helpful and cannot cure the infected needles.

Homeowners and other landowners can find information about tree care and tree diseases on the DNR website.



Daguerrotype of John Torrey, 1840.

Image courtesy Harvard University Library

President's Column

by Scott Milburn

First off, I would like to report that the 2013 Annual Symposium was a success with over 100 people in attendance. We knew going into this that we would likely spend more than we would be able to bring in. However, we were able to justify this due to our financial situation. In particular, we need to acknowledge an anonymous donor several years ago. That donation has been earmarked to help fund the symposium in situations like this. We pay for the travel costs and lodging for the various speakers and that can be a significant expense. We also need to keep the registration cost of the event low. Our event is considerably cheaper than the events hosted by other organizations and we would like to keep it that way while still attracting great speakers.

Additionally, we held board elections at the March monthly meeting. Ken Arndt remains on the board with the additions of Angela Anderson and Jyneen Thatcher. Both new board members are recently retired and we hope to keep them occupied and look forward to their contributions. The Board recently met and we held officer elections. The only change in officers for the upcoming year is the position of secretary. Mike Lynch will be taking over responsibilities for Andrés Morantes. I would like to point out that Andrés was a very valuable member of the Society in the past few years filling the role of both secretary and program coordinator. We need more folks to contribute like he did, even with a hectic personal schedule. The Society does need a new program

director and we are looking for volunteers who are interested in the position as well as promoting the mission of the Society as the first members envisioned.

With that, we are also looking to revive our conservation committee. The committee can be headed by anyone and we need members to step forward and serve on this committee. We have some big issues to track from grazing on public lands to funding of the SNA program. We have an opportunity to be a voice for what we believe in, but we need your help.

Plant Lore

by Thor Kommedahl

What is spring forget-me-not?

Spring forget-me-not is *Myosotis verna*, in the borage family. It is sometimes called scorpion-grass.

How did it get its names? Forget-me-not is a translation of Old French and whoever wore the flower was not forgotten by his or her lover. Gerard in 1633 called it scorpion-grass because the flowers [in racemes] grow on one side of the stalk and turning back like the tail of a scorpion. Dioscorides named it *Myosotis* because its velvety leaves resembled the ear of a mouse. *Verna*, of course, means spring.

Where does it grow? It is native to dry woods, openings, and banks of the Minnesota River.

What does the plant look like? It is an annual or winter annual, 4-15 inches tall, with small, white flowers. The branches are less curled than the familiar blue forget-me-not. There is one leaf per node. Flowers have 5 petals and the sepals are 5-lobed, with 3 lobes shorter than the other 2. The fruit is a nut-



Myosotis verna.

Image by Tom Barnes, University of Kentucky.
Image @ USDA PLANTS Database

let 1.2 to 1.5 mm long. They bloom April to June.

Is it medicinal or poisonous? It is neither. Because of the resemblance of the inflorescence to scorpions it was considered early on to be a remedy for the sting of a scorpion bite. In Kenya, women made a leaf tea of a member of the borage family to induce early labor. Also, pregnant elephants were observed to feed on borage tree leaves near the end of the gestation period presumably for the same reason. These observations have not been verified experimentally.

Has it any other value? It is included in the National Wetland Plant List of Wetland Indicator plants, as a FACU (facultative upland) species in the Upper Midwest.

New Life Members

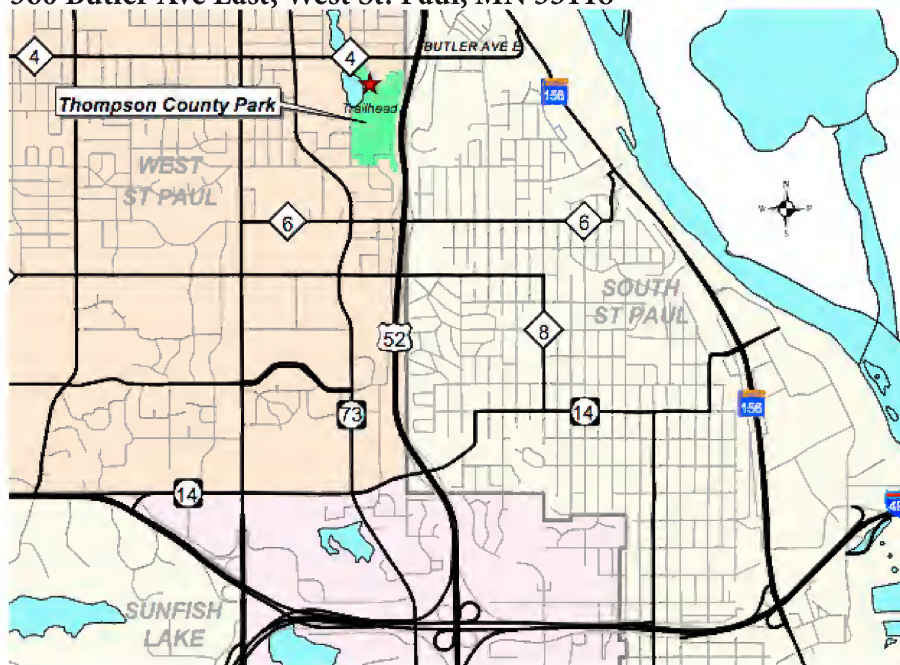
MNNPS is pleased to announce four new life members to date in 2013. They are:

Jeanette Leete and Sean Hunt
Ken and Erika Arndt

Minnesota Native Plant Society
P.O. Box 20401
Bloomington, MN 55420

Spring/Summer 2013

Thompson County Park
360 Butler Ave East, West St. Paul, MN 55118



Directions:

Take Highway 52 to the Butler Ave. E. exit in West St. Paul.
Go west on Butler 0.2 mile to Stassen Lane.
Go south on Stassen Lane to Thompson County Park.

Monthly Meetings Resume

The MNNPS monthly membership meetings “summer break” has ended.

The 2013 monthly program schedule will resume Thursday, October 3rd, with doors opening at 6:00 p.m., and the program beginning at 7:00 p.m.